

Departmental Application for HHMI Course Transformation Program

Howard Hughes Medical Institute – HHMI Course Transformation Program

Department: Biology/Chemistry/Physics/Math Department

Course you are proposing to transform (ex PHY 2049): Critical Science Course (“STEM 1000”)

Faculty team members (Name, title, email, involvement)

Name	Title	Email	Involvement		
			Design	Pilot	Scale-up
Charles Darwin	Assoc. Prof	darwinc@fiu.edu	X	X	
Marie Curie	Professor	mcurie@fiu.edu	X	X	
Emmy Noether	Assoc. Prof	enoether@fiu.edu			X
Albert Einstein	Assist. Prof	aeinstein@fiu.edu			X

Primary point of Contact: Charles Darwin, cdarwin@fiu.edu

Please describe the rationale/motivation for transforming this particular course (include information about enrollment numbers, and primary student population in the course – e.g. upper division, science majors, service course, etc. Also, please describe what is the usual departmental teaching assignment for this course)

“STEM 1000” (“critical STEM course”) serves hundreds of students every year, from different STEM majors. Due to the nature of the material and the number of topics that must be covered, many students struggle through this course. Additionally, “STEM 1000” is an introductory level course, taken mostly by freshmen and sophomore STEM majors. Thus, success in this course is critical for student retention and persistence in STEM, making it a perfect candidate for pedagogical reform.

In the recent years, some changes have been implemented in “STEM 1000” to improve student performance and success, but we believe that students can further benefit from modifications in the curriculum and the way the material is presented. For example, there have been several courses in the department that have been transformed and our team believes that some of those strategies would be beneficial for “STEM 1000”. We can draw from some of the experiences of the team and other faculty members in the department to implement active learning strategies that, even in large courses such as “STEM 1000”, will support student learning and achievement.

The course is usually taught in 4 different sections, each led by an individual instructor. The four faculty members listed in this application are the primary instructors for “STEM 1000” and expect to continue that assignment in the coming years. Thus, support of this transformation will have lasting impact in the department. Of the four different sections, two sections will pilot the transformation.

Please describe what you anticipate the course will look like after your participation in the course transformation program:

Rocio B 2/6/2015 12:11 PM

Comment [1]: Please provide the member of the team that will be the primary contact for communications. Other team members will be cc'ed in any emails.

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Comment [2]: Providing a thorough vision of your plan is beneficial. We don't expect all the details to be provided and expect ideas to evolve as you delve into the project.

The transformed sections will include active learning elements from different strategies. The course will follow a “flipped” classroom model and students will prepare before class by watching several short lectures (of 10 minutes or less), completing homework, and reading selected textbook passages. In the classroom, students will work out problems in small groups or pairs and hold discussions. After each problem, we will review the work in whole class discussions or through the iClicker response system. Even though we plan to incorporate several active learning activities in class (e.g. iClickers, one-minute papers, think-pair-share, and group discussions) we will keep a fairly consistent class structure during the semester so that students know what to expect.

In addition to the traditional assessments (3 midterm exams and 1 final), the reformed sections will include weekly online quizzes to be completed before class. This strategy aims to incentivize students coming prepared to class. Class participation will also be an element of student assessment, by including clicker questions and group work as part of the final grade.

In the transformed sections, we will incorporate Learning Assistants to facilitate discussions, help students if they have difficulty with an activity, give feedback, and serve as liaisons between the instructors and the students. LAs will be essential for the transformation as in-class time will be primarily spent with group activities, discussions, and problem-solving sessions. Besides helping students during class, the LA-student interactions will help students develop their study-skills as they emulate the thinking process they should go through while doing homework or studying. LAs and lead instructors will meet every week to reflect on the past week and prepare for the following week(s).

We should add one more important point. Besides the curricular transformation, we plan to include a structural change to the semester. The first exam will be fairly soon in the semester to allow us to identify students that might be at risk of dropping or failing the course. We will reach out to those students and encourage them to attend “office hours” during the week. These office hours will be held both by the professors and the LAs in both sections. LAs will rotate through these office hours through the semester. A similar strategy has been incorporated in other introductory courses with high success rate and we believe that it will be successful in “STEM 1000” too.

Please describe your timeline for preparing for, piloting, implementing, and scaling up the innovation. What will be the specific roles of the faculty members involved? Note that the timeline may span several years, as appropriate.

Design and Pilot: “STEM 1000” usually holds four sections per semester. Two of those sections will be piloting the innovation. Drs. Darwin and Curie will be the designing the curriculum during the summer and piloting the innovation during the following fall and spring in their “STEM 1000” sections. Drs. Noether and Einstein will be involved in discussions and provide feedback, but will not be incorporating curricular changes to their two “STEM 1000” sections. Additionally, all four sections will participate in administering instruments to assess student performance and attitudes.

Scaling Up: All curricular elements designed during the transformation will be available to all “STEM 1000” instructors. All “STEM 1000” instructors are committed to continuing the innovation, including Drs. Noether and Einstein who will incorporate strategies into their sections after the pilot. After the pilot year, the team will hold discussions and further improve on the innovation. The following semesters, the four instructors will incorporate the strategies to their sections.

Please fully describe your plan for sustaining and expanding the innovation to additional sections.

All curricular elements (videos, activities, etc.) designed during the transformation will be available to all “STEM 1000” instructors for future use. Additionally, all instructors are committed to continuing the innovation, including Drs. Noether and Einstein who will incorporate strategies into their sections after

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Comment [3]: You are welcome to propose any creative strategy (curricular or otherwise) that you think will benefit student performance and retention in the course.

the pilot. The instructors will also like to continue assessing and improving the course after the initial transformation, so the team is planning on continuing to administer appropriate pre-post assessments to the courses. Our department is committed to enhancing student success and will be continuing their support of LAs for this course.

Have you identified any curricula for potential adoption? (This is non-binding) If so, why have you identified this curriculum?

Yes, we will incorporate the flipped classroom model and add active learning strategies during the in-class time.

Are you aware of any assessments that could be used to allow us to gauge student learning or other metrics in the class you will be transforming? (This may include national normed conceptual tests, common exams from national organizations, etc.)

Classroom reform has benefitted from a variety of assessments that would provide valuable feedback to the team and to the HHMI project. These assessments include XCI for conceptual understanding of “STEM 1000” concepts, C-LASS-X for attitudes toward “STEM 1000” subject, and SALG for students’ perspectives on learning gains. Additionally, we will have common exam questions across sections to for investigating increased retention and performance in the course.

Do you anticipate using LAs or PLTL leaders in this course? If so, please describe their role and what type of preparation/support will be offered to them?

We will be incorporating LAs as part of the course transformation.

Do you have anything further you would like us to consider in the application?

We have a letter of support for my application from Dr. BBB who has agreed to work with the team to provide additional feedback. Dr. BBB has been implementing reform instruction for X years and will be attending the design/planning meetings and advising the team during the transformation.

Also, please find a letter of support from the Departmental Chair attached.

We would like to request 4 LAs per transformed section, anticipating that I will be able to secure funding for 2 through my department. Additionally, the transformed sections would benefit from utilizing the active-learning classrooms.

Please attach:

- Letter of support from Departmental Chair
- Any other supporting information

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Comment [4]: The course transformation can draw from available established curricula such as flipped classroom, modeling, team-based learning, POGIL, SCALE-UP, etc.

Laird Kramer 2/10/2015 10:22 AM

Comment [5]: Identifying assessments is important, especially when it comes to matching them with the expected outcomes that are important to you. Having some assessments identified dramatically reduces the burden on the management team.

Laird Kramer 2/10/2015 10:38 AM

Comment [6]: Identifying any support that you have which can be leveraged to further ensure the success of a project is great to show. Other things that would be beneficial might include an indication of where the results might be presented or possibly where you will go to get training on the curriculum if there is no local support available.